SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, June 16.—"Thermal Radiation in Absolute Measure." By Dr. J. T. Bottomley, M.A., F.R.S.

The paper contains an account of an experimental investigation by the author in continuation of researches on the same subject which have been already published (Roy. Soc. Proc., 1884, and Phil. Trans., 1887). In the earlier experiments metallic wires heated by an electric current were used. The loss of heat from a heated body, however, depends to some extent on the form and dimensions of the body; and it seemed important to experiment on the loss of heat from bodies differing in form from the wires already used, and larger in dimensions.

Accordingly, two copper globes used by Mr. D. Macfarlane in 1872 (Roy. Soc. Proc., 1872, p. 93) were employed for a new series of experiments.

After preliminary experiments (using the same enclosure which Macfarlane employed and with the surfaces of Macfarlane's globes prepared in four different ways) new apparatus was constructed. The object was to experiment both with full air pressure and with different amounts of exhaustion of the air, and Macfarlane's enclosure is unsuitable for this purpose.

In the arrangement adopted, the heated globes were hung at the centre of a hollow metallic sphere, which was connected with the Sprengel pump and surrounded with cold water, and were allowed to cool. The temperature of the cooling globe was read off at equal intervals of time by means of a thermo-electric junction; and from these readings the absolute loss of heat per unit of cooling surface, per unit difference of temperatures of surface and surroundings, per unit of time, is calculated.

The details of the apparatus and method of experimenting are given in the paper. It is enough to say here that the globes were used with their surfaces in two different conditions:—(1) Thinly coated with lamp-black, and (2) silvered and brightly polished; and in both conditions the absolute loss of heat, both in air and in vacuum more or less complete, was determined. The tables and curves attached to the paper give the details of the results.

To quote one or two examples:—With the sooted surface a total loss of heat by convection and radiation of $3\cdot42 \times 10^{-4}$ c.g.s. units per square centimetre, per second, per 1° C. of difference of temperatures of globe and surroundings, was observed with a difference of temperatures of 100° C., and with the surroundings at about 14° C. Under similar circumstances the radiation in vacuum of $\frac{1}{2}$M (half-a-millionth of atmospheric pressure of non-collapsible gas) was about $1\cdot40 \times 10^{-4}$.

Taking a silvered and brightly-polished surface under the same circumstances, the loss in full air was $2\cdot30 \times 10^{-4}$ c.g.s.; and with the highest vacuum and brightest polish obtained, it was reduced $1\cdot80 \times 10^{-5}$, with in this case a difference of temperatures of 180° C. The loss with 100° C. difference would be considerably less, but is not known experimentally at present.

The author returns thanks to Mr. James H. Gray, M.A., B.Sc., for excellent assistance given; and expresses himself most deeply indebted, both for assistance in experimenting and calculating of the results, and for most valuable and ingenious aid of various kinds during the course of this work, to his friend Mr. A. Tanakadate, now Professor in Tokio, Japan.

Entomological Society, October 5. Henry John Elwes, vice-president, in the chair.—Mr. C. O. Waterhouse exhibited a specimen of *Latridius nodifer* feeding on a fungus, *Trichosporium roseum*.—Mr. McLachlan, F.R.S., exhibited a male specimen of *Elenchus tenuicornis*, Kirby, taken by the Rev. A. E. Eaton, on August 22 last, at Stoney Stoke, near Shepton Montague, Somerset, and described by him in the *Entomologist's Monthly Magazine*, October 1892, pp. 250-253. Mr. McLachlan stated that another specimen of this species had been caught about the same date in Claygate Lane, near Surbiton, by Mr. Edward Saunders, who discovered that it was parasitic on a homopterous insect of the genus *Liburnia*, and had also described it in the *Entomologist's Monthly Magazine*.—Mr. J. M. Adye exhibited, for Mr. McRae, a large collection of *Colias edusa*, *C. edusa* var. *helice*, and *C. hyale*, all taken in the course of five days' collecting in the neighbourhood of Bournemouth and Christchurch, Hants. There were twenty-six specimens of *helice*, some of which were remarkable both in size and colour. He stated that Mr. McRae estimated the proportion of the variety *helice* to the type of the females as one in fifty. Mr. Adye also exhibited two specimens of *Deiopeia pulchella*, recently taken near Christchurch. Mr. Hanbury, Mr. Jenner-Weir, and Mr. Merrifield commented on the interesting nature of the exhibition, and on the recent extraordinary abundance of *C. edusa* and the var. *helice*, which was probably not exceeded in 1877.—Mr. Dallas-Beeching exhibited four specimens of *Plusia moneta*, lately taken in the neighbourhood of Tunbridge Wells.—Mr. H. Goss exhibited, for Mr. Gervase F. Mathew, two *Plusia moneta* and their cocoons, which were found at Frinsted, Kent, on September 3 last. It was stated that Mr. Mathew had found seven cocoons on the under side of the leaves of monkshood, but that the imagos had emerged from five of them.—Mr. Rye exhibited a specimen of *Zygæna filipendulæ* var. *chrysanthemi*, and two varieties of *Arctia villica*, taken at Lancing, Sussex; also varieties of *Coccinella ocellata* and *C. oblongoguttata* from Oxshott.—Mr. A. H. Jones exhibited specimens of *Argynnis pales* var. *isis*, and var. *arsilache*, the females of which showed a tendency to melanism, recently taken in the Upper Engadine; also melanic forms of *Erebia melampus*, and a specimen of *Erebia nerine*.—Mr. Elwes exhibited specimens of typical *Erebia melas*, taken by himself in the Western Tyrol, on July 25 last, at an elevation of 7000 feet; also specimens of the same species from Hungary, Greece, and the Eastern and Central Pyrenees. He stated that the absence of this species from the Alps, which had seemed to be such a curious fact in geographical distribution, had been first disproved by Mrs. Nicholl, who discovered it at Campiglio two years ago. He also exhibited fresh specimens of *Erebia nerine*, taken at Riva, on the lake of Garda, at an elevation of about 500 feet; also specimens of the same species, taken at the same time, at an elevation of about 5000 feet, in cool forest glades; and remarked that the great difference of elevation and climate did not appear to have produced any appreciable variation in this species.—Mr. G. T. Porritt exhibited two varieties of *Abraxas grossulariata*, bred during the past summer from York larvæ. Also a curious Noctua taken on the sandhills at St. Anne's-on-Sea on August 20 last, and concerning which a difference of opinion existed as to whether it was a melanic form of *Agrotis cursoria* or of *Caradrina cubicularis*. Also a small dark form of *Orgyia antiqua*, which had occurred in some numbers at Longridge, near Preston.—Mr. A. Eland-Shaw exhibited a specimen of *Mecostethus grossus*, Linn., taken lately at Irstead, in the Norfolk-broad district. He stated that this was the first recorded capture of this species in Britain since 1884.—Mr. C. G. Barrett exhibited a specimen of *Syricthus alveus*, caught in Norfolk about the year 1860; a beautiful variety of *Argynnis euphrosyne*, caught this year near Godalming; and a series of varieties of *Ennomos angularia*, bred from a female taken at Nunhead.—Mr. P. Crowley exhibited a specimen of *Zygæna filipendulæ* var. *chrysanthemi*, taken last August at Riddlesdown, near Croydon.—Lord Walsingham, F.R.S., sent for exhibition several specimens of larvæ of *Sphinx pinastri*, preserved by himself, which were intended for presentation to the British Museum. The larvæ had been sent to him by Lord Rendlesham, who obtained them from ova laid by a female captured in Suffolk last August.—M. de Nicéville communicated a paper entitled "On the variation of some Indian Euplœas of the subgenus *Stictoplæa*"; and Captain E. Y. Watson exhibited, on behalf of M. de Nicéville, the specimens referred to in this paper. Colonel Swinhoe, Mr. Hampson, Mr. E. B. Poulton, F.R.S., and the chairman took part in the discussion which ensued.—Mr. W. Bateson read a paper entitled "On the Variation in the Colours of Cocoons and Pupæ of Lepidoptera; further Experiments."—Mr. Poulton read a paper entitled "Further Experiments upon the Colour-relation between certain Lepidoptera and their Surroundings."—Miss Lilian J. Gould read a paper entitled "Experiments on the Colour-relation between certain Lepidopterous larvæ and their surroundings, together with observations on Lepidopterous larvæ." A long discussion ensued, in which Mr. Jenner Weir, Dr. Sharp, F.R.S., Mr. Merrifield, Mr. Poulton, and the chairman took part.

PARIS.

Academy of Sciences, October 10. M. Duchartre in the chair. M. Emile Picard presented to the Academy the second volume of his "Traité d'analyse."—The University of Padua invited representatives of the Academy at the forthcoming tercentenary celebration of Galileo's accession to his chair at that University.—A decisive blow to the theory of centripetal and ascending motion in cyclones, by M. H. Faye.—The move-

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ments of the heart, studied by chronophotography, by M. Marey. The heart of a tortoise was removed and mounted so that a funnel led into an auricle, and a bent tube out of the ventricle and upwards to the mouth of the funnel. The funnel was filled with defibrinated blood, which passed into the auricle and thence into the ventricle. When the latter was full, an automatic systole projected the blood upwards through the tube and back into the funnel. This process was repeated for several hours after death. It was more minutely studied by taking a series of instantaneous photographs in rapid succession (reproduced), which show the details of the process with great accuracy. For actinic purposes, the heart was painted white with water-colour. The hypothesis of an active diastole of the ventricle was proved to be unfounded.—The inhibitory phenomena of the nervous shock, by M. H. Roger.—On the transformation of the equations of Lagrange, by M. Paul Painlevé.—On a class of curves and surfaces, by M. A. Pellet. On the motion of a thread in space, by M. G. Floquet.—On internal reflection in crystals, by M. Bernard Brunhes.—A new method of preparation and photometry of the phosphorescent sulphide of zinc, by M. Charles Henry. It is possible to obtain several pounds at a time of a fine phosphorescent zinc sulphide by the following process: Add ammonia to a perfectly neutral solution of pure zinc chloride; redissolve the precipitate in an excess of ammonia; precipitate completely, but without the slightest excess, the ammoniacal oxide of zinc by sulphuretted hydrogen; heat to a white heat in a crucible of refractory earth placed inside a graphite crucible, after having well washed and dried the amorphous sulphide to the exclusion of all impurities. By Mascart's photometer, the intensity of light emitted by a sample of the sulphide in candle-metres after saturation was 0·000215. But this value is probably too small.—On the antimonites of pyrogallol, by MM. H. Causse and C. Bayard.—On the tartaric ethers, by M. P. Freundler.—Volumetric determination of the alkaloids, by M. L. Barthe.—On a new method of brick manufacture, used in certain parts of Central Asia, by M. Edouard Blanc. This mode of manufacture is practised by the tribes in Western Mongolia, on the frontier of Siberia. The extremes of temperature render a brick of great durability a necessity of life. This is attained by the use of steam. The oven is cylindrical and surmounted by a hemispherical cap, which is kept open for the first three days. The bricks, about 7000 at a time, are baked by means of a fire fed by about 7000 kgr. of an annual ligneous plant, the *Alhagi Camelorum*. On the third day, the opening is closed with felt, which is kept constantly wetted, so that the bricks are enclosed in a steam bath, while kept at a red heat. Under these circumstances, some novel chemical reactions appear to take place. The bricks, red after the first period, appear dark grey after the second part of the process. Their structure appears porous; they become sonorous and acquire a great hardness. They show a striking resemblance to certain trachytes. Made from the same clay as our bricks, they resist weathering very much better, and have an extraordinary hardness and cohesion.—A process for testing the purity of coprah oils and palm oils, by M. Ernest Milliau.—On the part played by spermine in intra-organic oxidations, by M. Alexandre Poehl.—On the respiration, transpiration, and dry weight of leaves developed in sunlight and in the shade, by M. L. Geneau de Lamarlière.—On the structure of the assimilating tissue of the branches in Mediterranean plants, by M. William Russell.—Experimental study of the action of the humidity of the soil on the structure of branches and leaves, by M. Auguste Oger.—Contributions to the stratigraphy of the Pyrenees, by MM. Roussel and De Grossouvre.—On some bombs of Etna, from the eruptions of 1886 and 1892, by MM. L. Duparc and L. Mrazec.—Meteoric iron recently fallen at Hassi Iekna, in Algiers, by M. Stanislas Meunier.—Oceanographic observations relating to the basin of Arcachon (Gironde), by M. J. Thoulet.—Vegetation of the lakes of the Jura mountains, by M. G. Rambault Ant. Magnin.—M. Bischoffsheim, on behalf of Prof. Weineck, Director of the Prague Observatory, presented a photograph of the lunar crater Vendelinus.

DIARY OF SOCIETIES.

London.

SUNDAY, October 23.

Sunday Lecture Society, at 4.—The Distribution of Animals and what it Teaches (with Oxy-hydrogen Lantern Illustrations): Dr. Andrew Wilson.

TUESDAY, October 25.

Mineralogical Society.—Anniversary Meeting.—Council Report.—On Crystallized Zirconia (Baddeleyite), a New Mineral Species from Ceylon: L. Fletcher, F.R.S.—Preliminary Note on Xanthoconite and Rittingerite: H. A. Miers and G. T. Prior.—A Locality of Cerium Minerals in Cornwall; H. A. Miers.—On Gypsum from Herne Bay: F. Rutley.

FRIDAY, October 28.

Physical Society, at 5.—Discussion of Mr. Williams's Paper on the Dimensions of Physical Quantities.—Dicussion of Mr. Sutherland's Paper on the Laws of Molecular Force, to include Papers by Dr Young and Mr. Thomas on the Determination of Critical Density, Critical Volume, and Boiling Points.

BOOKS, PAMPHLETS, and SERIALS RECEIVED.

Books.—The Framework of Chemistry, Part 1; W. M. Williams (Bell).—A German Science Reader; F. Jones (Percival).—Chemical Lecture Experiments: G. S. Newth (Longmans).—Outlines of Psychology, new edition: Dr. J. Sully (Longmans).—Animals' Rights: H. S. Salt (Bell).—University College of North Wales Calendar for the Year 1892–93 (Manchester, Cornish).—The Climate of Rome and the Roman Malaria: Prof. Tommasi-Crudeli, translated (Churchill).—The Fauna of Liverpool Bay, Report 3 (Liverpool. Dobb).—Atomic Consciousness (Whimple, Harris).—Geographische und Naturwissenschaftliche Abhandlungen, I.: Dr. J. Rein (Leipzig, Engelmann).—Metal-Colouring and Bronzing: A. H. Hiorns (Macmillan).—The Telephotographic Lens: T. R. Dallmeyer (Dallmeyer).—The Geological and Natural History Survey of Minnesota: N. H. Winchell (Minnesota).—Brachiopoden der Alpinen Trias, Nachtrag I.: A. Bittner (Wien).—Atlas der Völkerkunde: Dr. G. Gerland (Gotha, J. Perthes).—British Fungus-Flora, vol. i.: G. Massee (Bell).

Pamphlets.—Rutherfurd Photographic Measures of the Stars about β Cygni: H. Jacoby (New York).—Ueber die Einseitigkeit der Herrschenden Krafttheorie: Dr. N. von Seeland (Leipzig, Pfeffer).—Weitere Untersuchungen über die Tägliche Oscillation des Barometers: J. Hann (Wien).

Serials.—Internationales Archiv für Ethnographie, Band 5, Heft 4 (Kegan Paul).—Annals of Scottish Natural History, October (Edinburgh, Douglas).—Palestine Exploration Fund. Quarterly Statement, October (Watt).—Transactions of the Leeds Naturalists' Club, &c., 1890, vol. 2 (Leeds).—Memoirs and Proceedings of the Manchester Literary and Philosophical Society, 1891-92, vol. 5, No. 2 (Manchester).—Notes from the Leyden Museum, vol. xiv. Nos. 1 and 2 (Leyden, Brill).—Morphologisches Jahrbuch, 18 Band, 4 Heft (Williams and Norgate).—Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie Sechzehnter Band, 2 Heft; Fünfzehnter Band, 4 Heft (Williams and Norgate).—Journal of the Royal Statistical Society, September (Stanford).—Mind, October (Williams and Norgate).—The Asclepiad, No. 35, vol. 9 (Longmans).—Medical Magazine, October (Southwood).—Jahrbuch der k.k. geologischen Reichsanstalt, Jahrg. 1892, xlii. Band, 1 Heft (Wien).—Bulletin of the New York Mathematical Society, vol. 2, No. 1 (New York).

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